

**US Army
Corps
of Engineers**
Portland District

JOHN DAY NAVIGATION LOCK EMERGENCY REPAIR

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Navigation Lock and Dam Inspection and Emergency Repairs
Workshop
Vicksburg, MS
18-20 April 2006

John Day Navigation Lock Emergency Repair Experiences

- 1984-2006 Downstream Lift Gate Fatigue Investigation and Repair
- 1990, 2001 Upstream Lift Gate Damage, Repair Replacement
- 2004 Monolith Repair
- Contracting Issues
- Safety

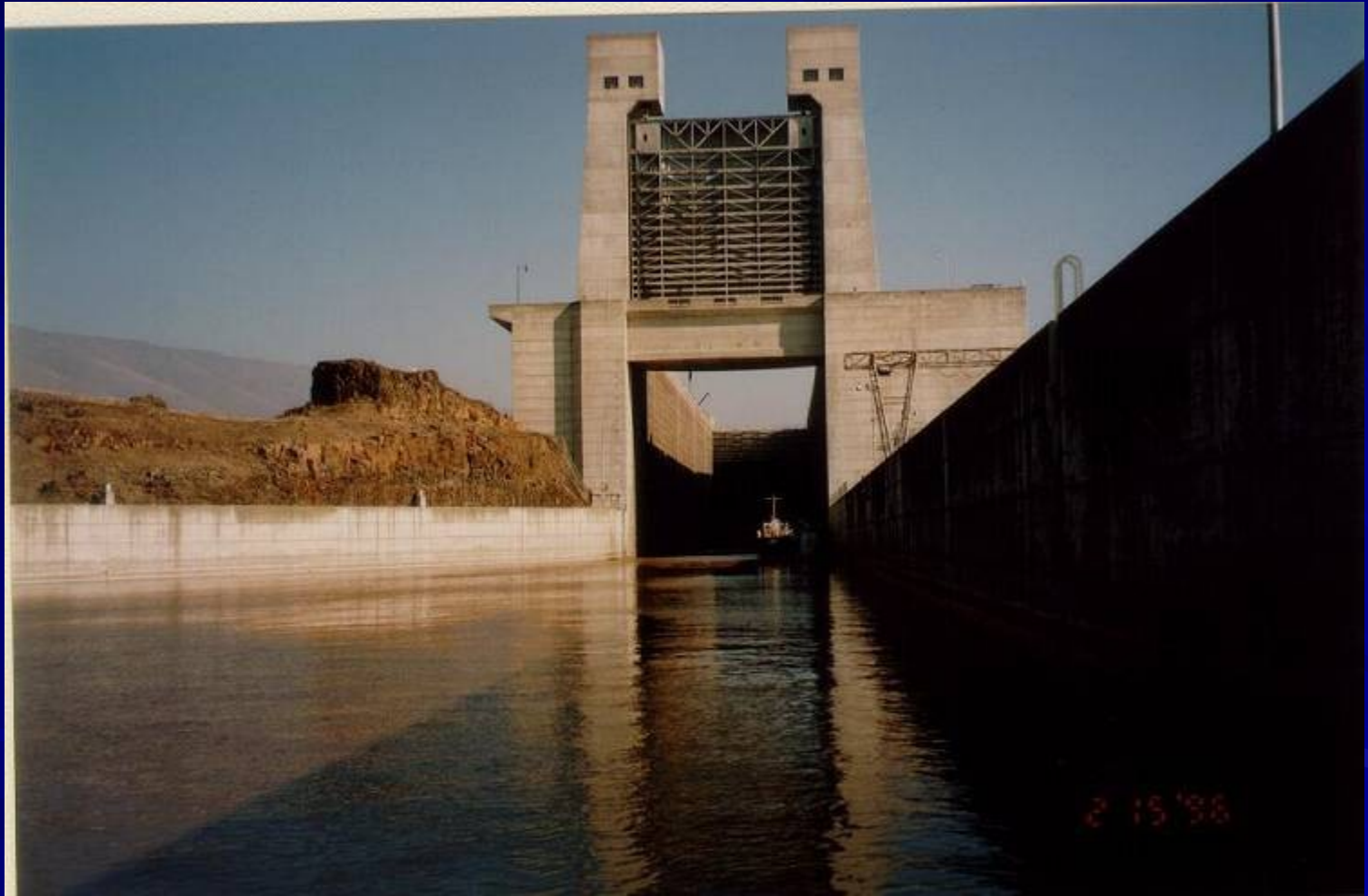
U.S. Navigation Locks

<u>Project</u>	<u>Lift</u>	<u>Year Opened</u>	<u>Gate Type</u>
John Day	110'	1968	Vertical Lift
Lower Granite	105'	1975	Miter
Ice Harbor	103'	1962	Vertical Lift
Lower Monumental Lift	103'	1969	Vertical
Little Goose	101'	1970	Miter
Wilson Lock	94'	1959	Bulkhead
Walter F. George	88'	1963	Movable
The Dalles	88'	1957	Miter
Bay Springs	84'	1985	?
McNary	83'	1953	Miter

Navigation Lock



Downstream Gate



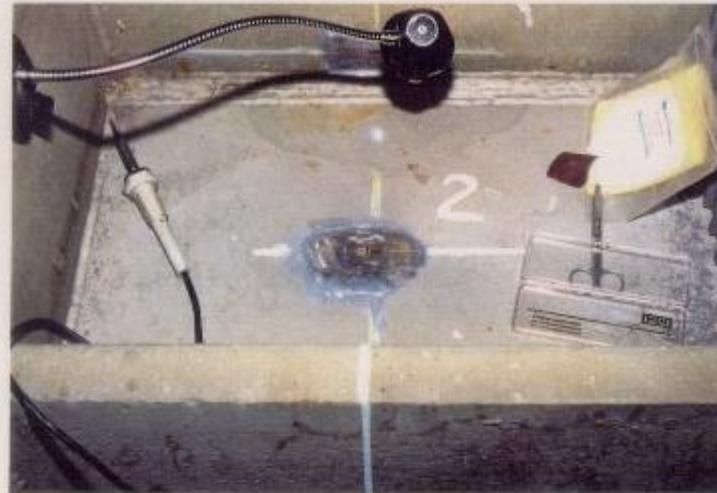


6 11'96





TYPICAL STRAIN GAGE INSTALLATION

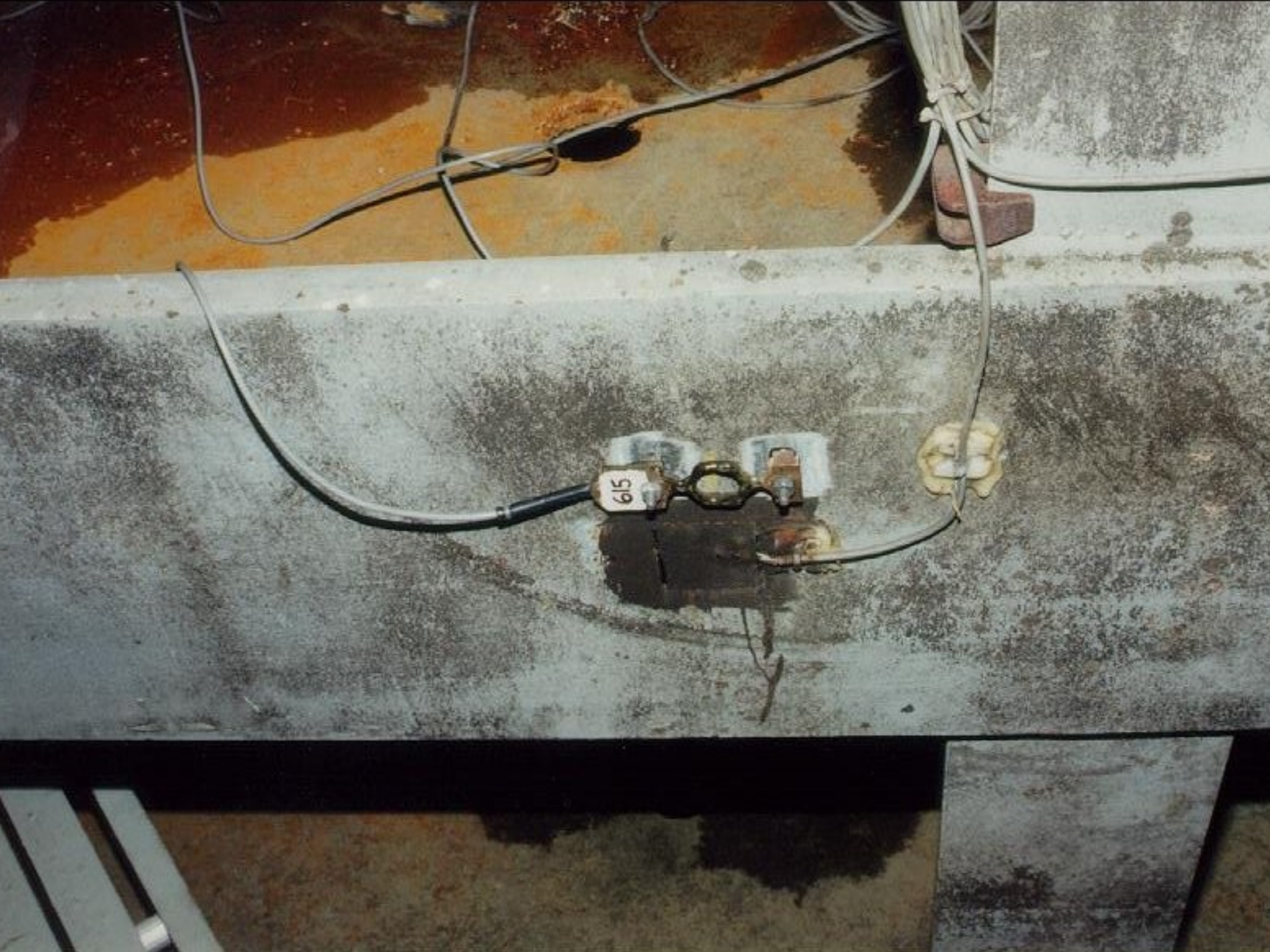


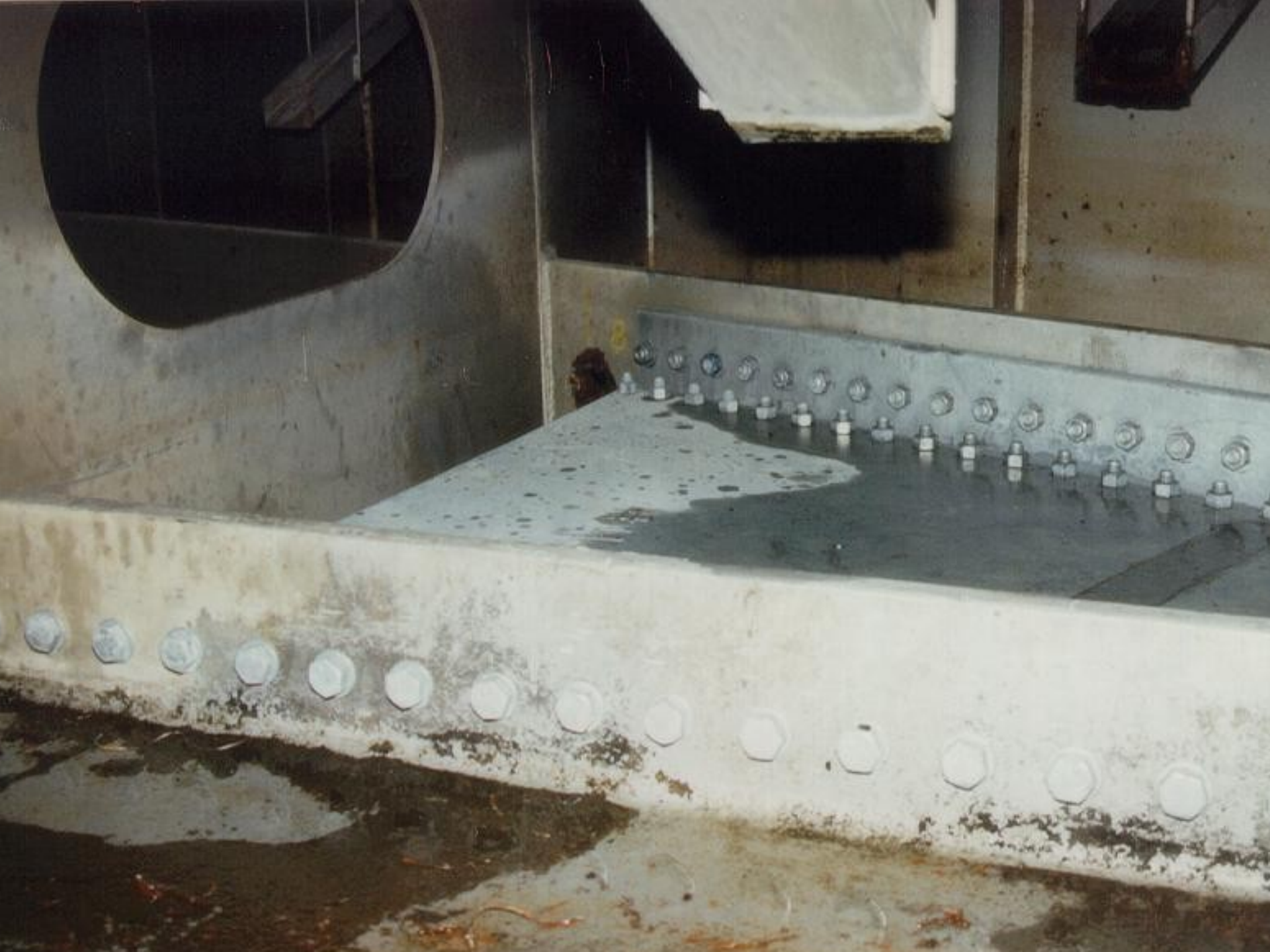
a) Strain gage on arch rib

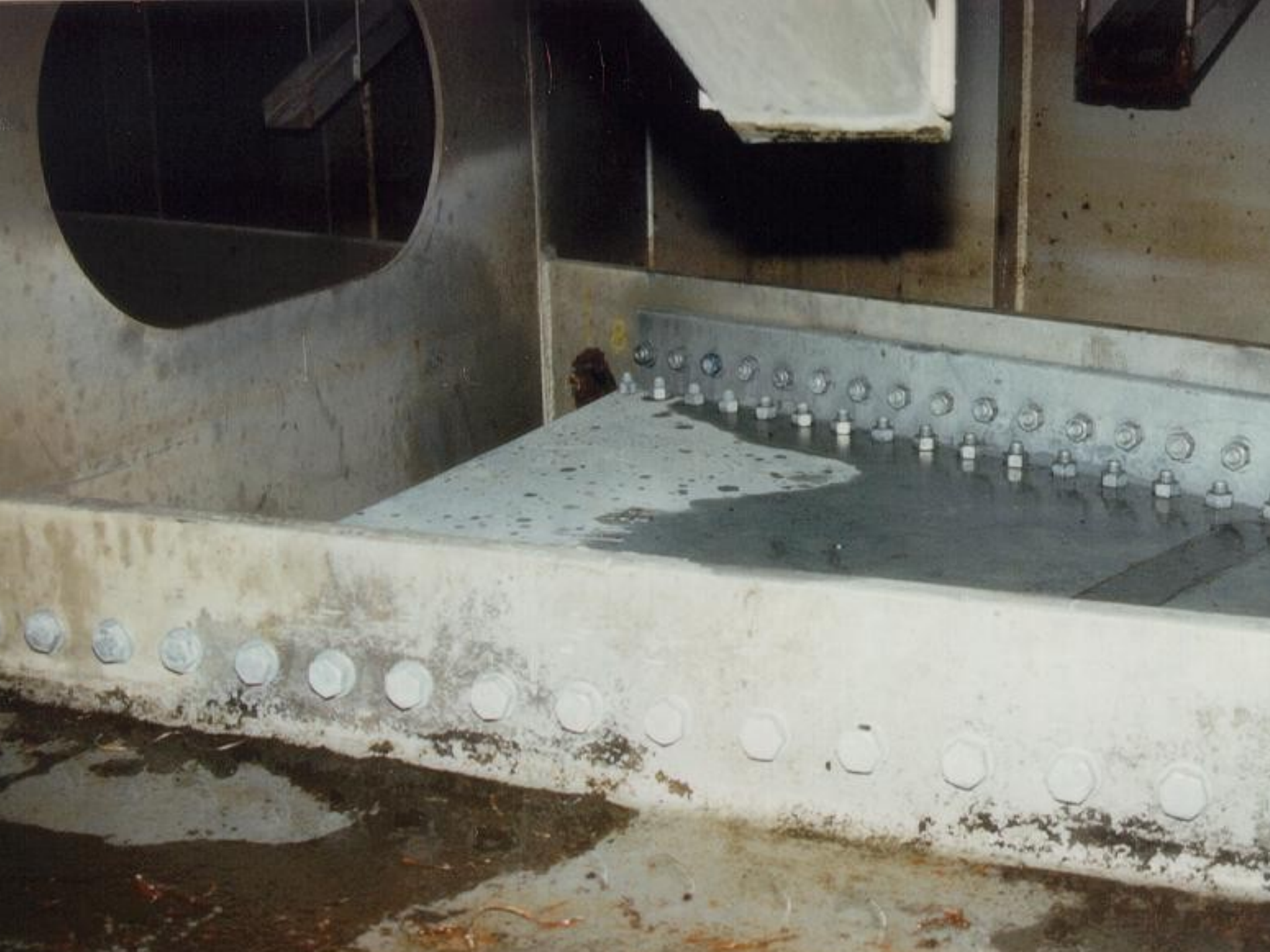


b) Wired and waterproofed strain gage

Figure VII.4











4 2'97



3/13/2001 11:56am

Repair Challenges

- Repair to high standards
- Monitor on 6 month basis, repair yearly
- All work performed during yearly maintenance outage
- All work performed with Contractors under competitive bid method
- Operations performing work – work with Ops to have high standards of repair
- Operations aware of issues/teamwork

Current Status

- Cracking is under control. Cracking still occurring with repairs during yearly maintenance outages
- Fatigue problems solved (?)
- Life of the gate expected to be 25 more years

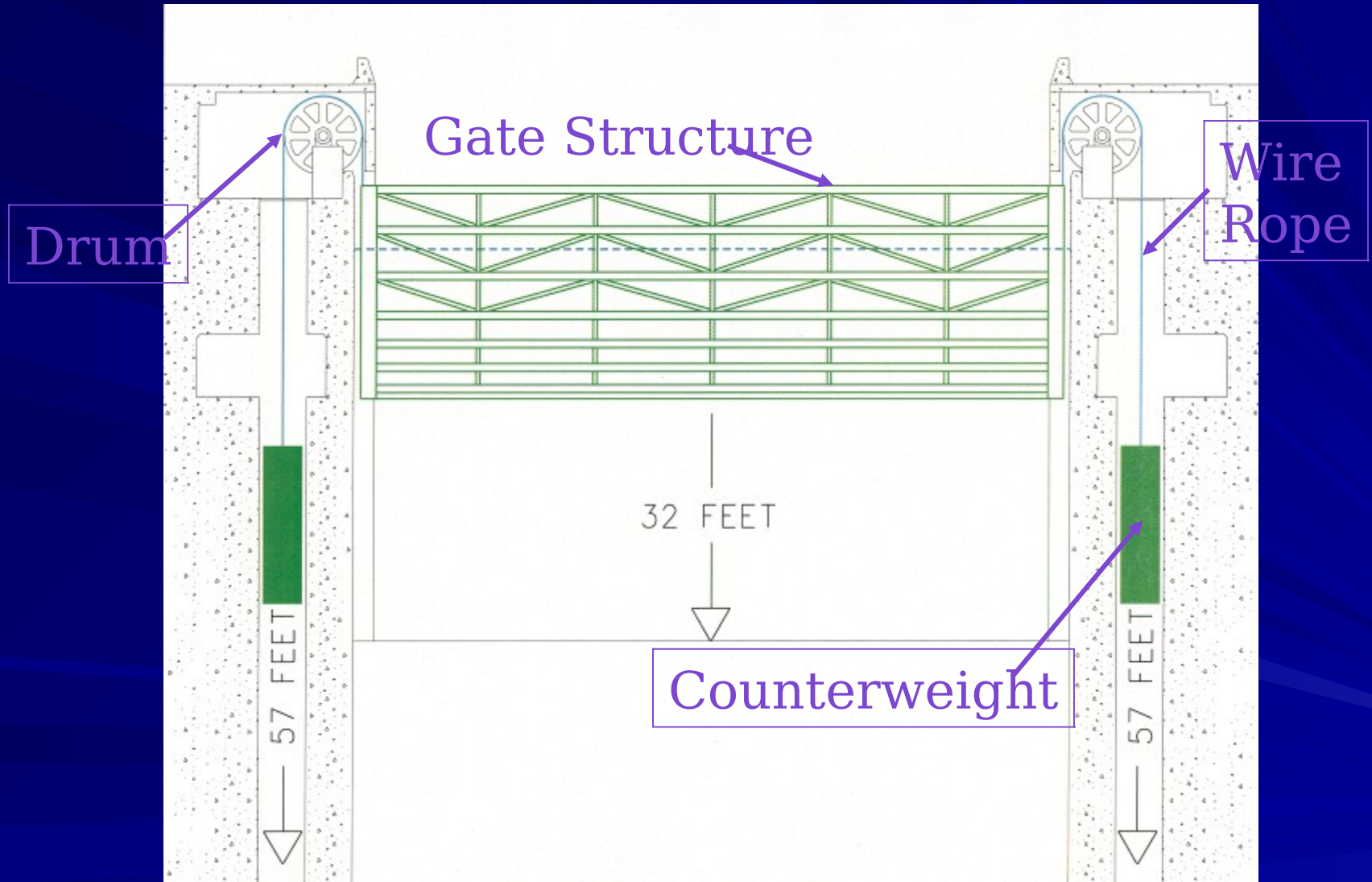
Upstream Gate in Navigation Lock



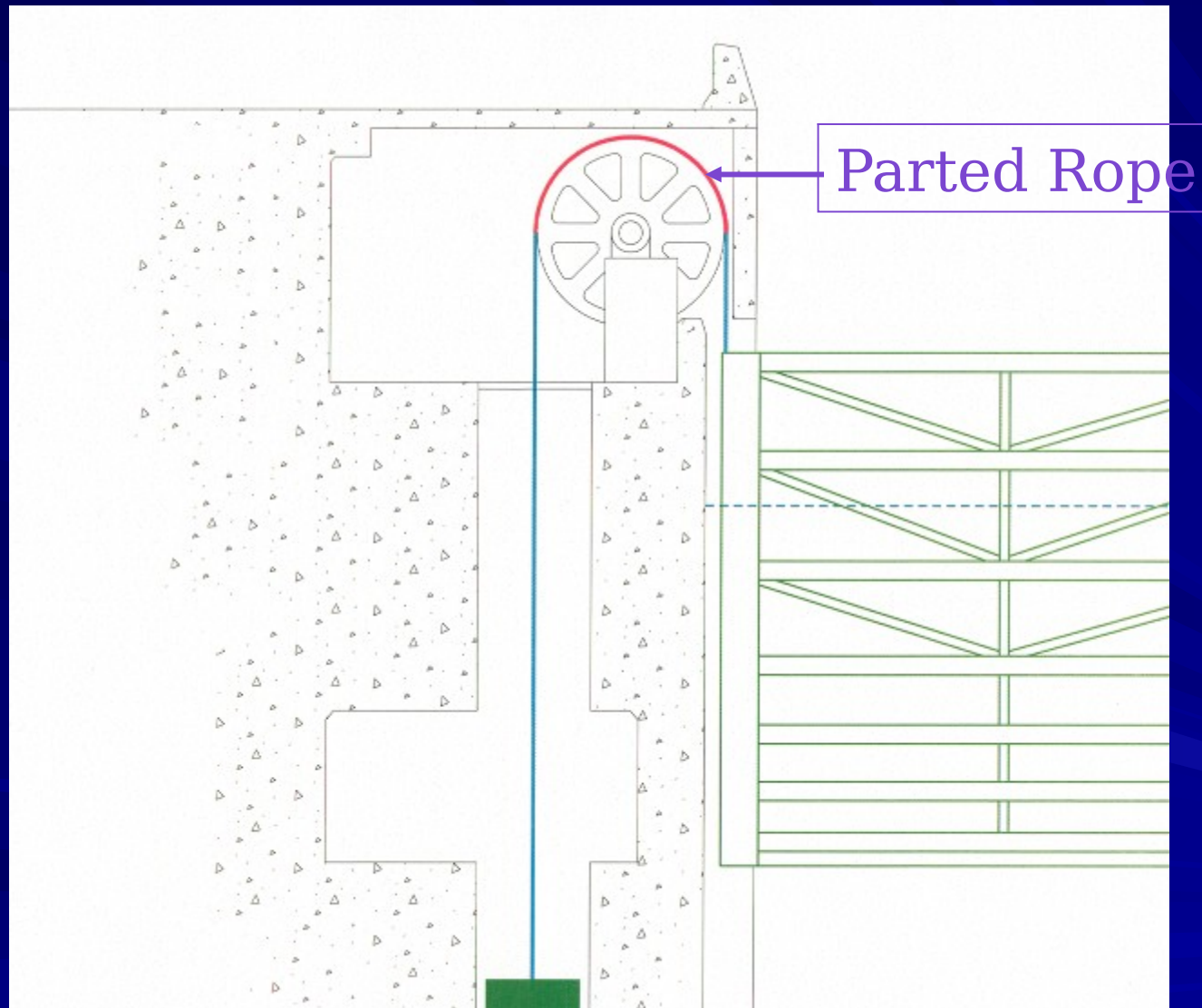
Failed Wire Rope



Upstream Gate Mechanism



Wire Rope Failure Location



Lock and Gate Damage

Gate Side Buckled

Broken Welds, Buckled Bearings



Gate Repairs

- Gate and counterweights were inspected shortly after they were removed from the lock.
- Determined that the gate was repairable; counterweights could not be repaired
- Decision was made to repair the gate and replace the wire ropes and counterweights
- Contract awarded to Knight Construction to repair and install the gate and replace the counterweights and wire rope for \$1.45 million on April 18.
- Emergency Operation of lock

Emergency Operation of the Lock



Installation of Repaired Gate



John Day Monolith Repair

Lift Joint Repair,
Monolith 6&8 Crack
Repairs

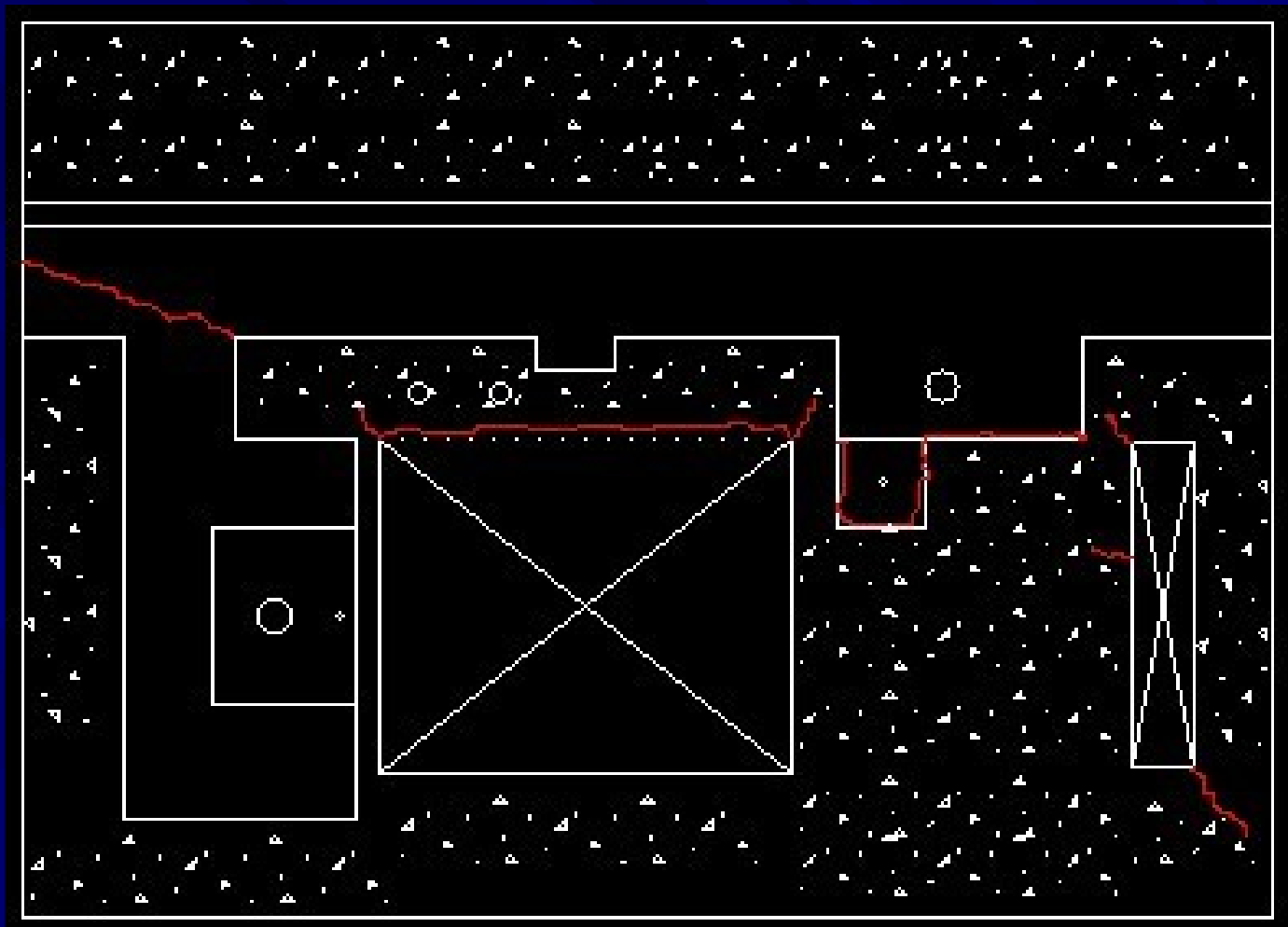


El. 263 Gallery
Cracking



Monolith 27



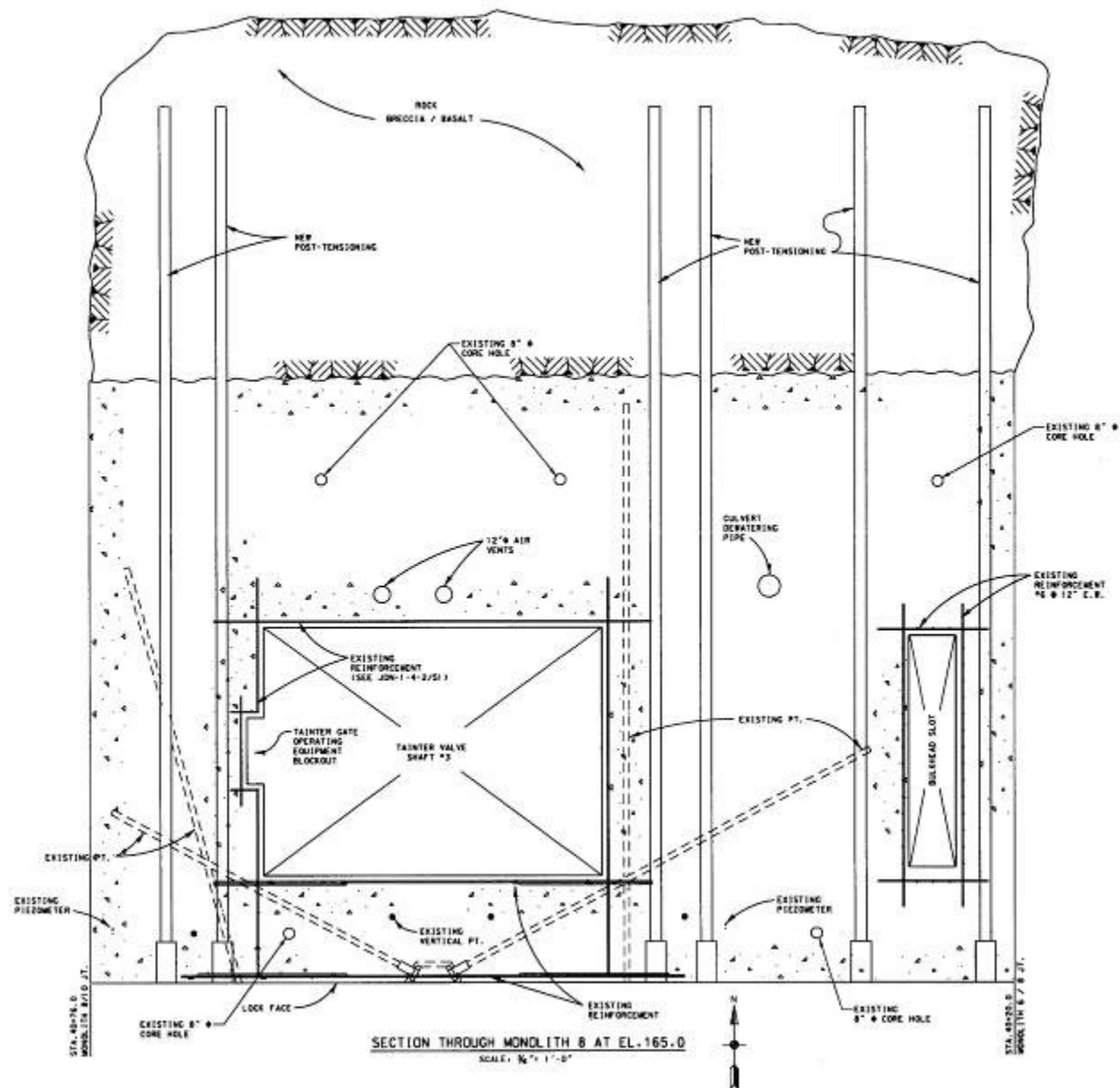


John Day Navigation Lock
Monolith 8 - Confirmed Crack

John Day Monolith Repair Contract

Main Features of Contract

- Foundation Grouting (prior to anchor installation, M8, M27)
- Upstream bulkhead fabrication and installation (drain hole drilling to be performed prior to dewatering)
- PT Monolith 8 (anchorage zones in rock, concrete and with anchor blocks)
- PT monolith 27 (anchorage zones in rock and concrete)
- Repair Monoliths 6 & 8 faces



Monolith Joint - Paste Epoxy Injection



Monolith
joint

Injection
Ports





John Day Monolith Repair Contract

Main Features of Contract - contd'

- Lift line repair (M8, M27)
- Repair tainter valve shaft face
- Repair upstream bulkhead slot
- Excavate and Backfill M8 to el 235
- Drain routing through boneyard

John Day Monolith Repair Contract Investigation/Work prior to advertisement

- Fabricate New bulkhead (8a contracting method for short timeframe)
- Flow breccia anchor testing, Rate of drilling testing, Test of grout bond strength testing (by grout consultant)
- Anchor design questions:
 - Bond zone/anchorage zone design considerations
 - Corrosion Protection
 - Creep/retensioning considerations
- Compressed Design Schedule

John Day Monolith Repair Outage Issues

- Construction specialist worked on how to complete work in adequate timeframe
- Lock outage in march to be extended to perform
 - Epoxy crack grouting
 - Anchor installation
 - Lock concrete repair below tailwater
- 12 hour outages above tailwater for anchor drilling/installation

Reed McDowell

John Day Monolith Repair Construction Issues

- 15 day advertise
- Best Value (Contract Cost \$11.7 million)
- Expedited submittals
- Contractor Selection based on
 - Capability
 - Experience
 - Mobilization ability
- Schedule
- Safety







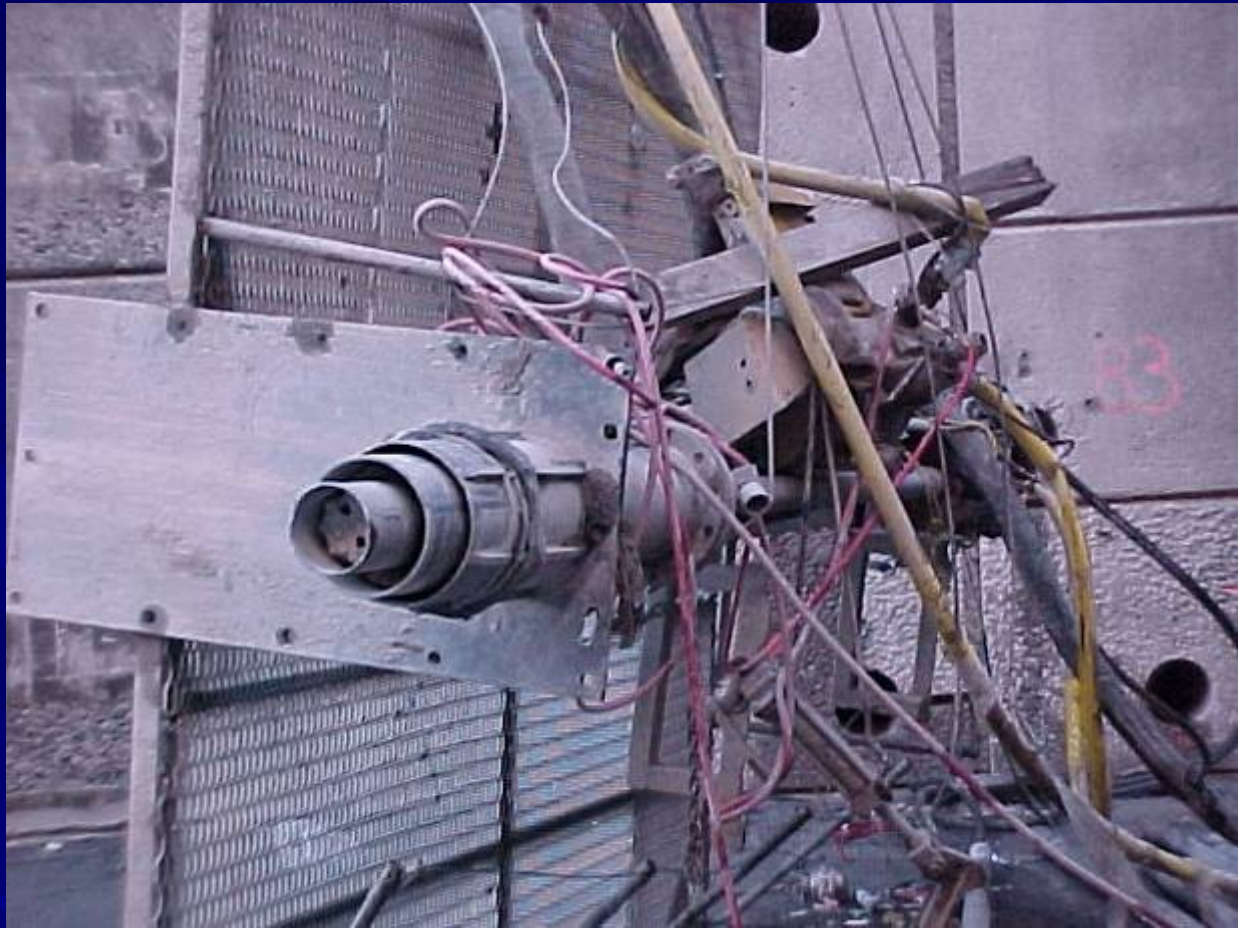
















John Day Navigation Lock Capability/Lessons Learned

- Best Value RFP Format Good Application**
- Include KTR safety record in evaluation criteria**
- Heightened awareness of safety during compressed schedules**
- Design/Construction/Operations/Ktr Teamwork**

John Day Navigation Lock Capability/Lessons Learned

- **Perform thorough/timely inspections**
- **Perform necessary maintenance**
- **Design/Operations Communication**
- **Coordinate with River Users**
- **Remember SAFETY**

Questions

